D.) AMENDMENTS TO THE DRAWINGS

None.

E.) REMARKS

This Response is filed in response to the Office Action dated August 10, 2005.

Upon entry of this Response, claims 1-10 will be pending in the Application.

In the outstanding Office Action, the Examiner rejected claims 1-10 under 35 U.S.C. § 103(a) as being unpatentable over Rabiet et al. (U.S. Patent No. 5,230,788) or when taken further in view of Celnik (U.S. Patent No. 4,617,729).

Rejection under 35 U.S.C. 103

The Examiner rejected claims 1-10 under 35 U.S.C. § 103(a) as being unpatentable over Rabiet et al. (U.S. Patent No. 5,230,788), hereinafter referred to as "Rabiet", or when taken further in view of Celnik (U.S. Patent No. 4,617,729), hereafter referred to as "Celnik".

Specifically, the Examiner stated that Rabiet teaches, *inter alia*, a substrate, e.g., aluminum, is given a first anodization, i.e., oxidized using an electrolytic bath of a sulfuric acid-CrO_3 solution, and a second anodization is given using boric acid and ammonia. The Examiner indicated that, as applied to claim 2, column 4 of Rabiet teaches that electrolytic recharging by either subtractive or panel plating or semi-additive method can be used to provide the contacts on the metal oxide layer. With respect to claims 5 and 6, the Examiner indicated that Rabiet teaches using an ammoniacal solution, which has a water-soluble salt, e.g., a chromate therein. With respect to claims 7 and 8, the Examiner indicated that it is held that the composition and concentrations of water-soluble salts, as well as the use of copper acetate as a conduction-aiding agent are each with the ordinary skill of an artisan and therefore would have been obvious thereto. The Examiner further stated that the use of copper acetate is normally used to plate copper onto aluminum.

The present invention includes a method for manufacturing a high-efficiency thermal conductive base board for electrical connection with an electronic component, comprising the steps of: (a) placing a metal substrate in an electrolytic bath; (b) oxidizing the metal substrate in the electrolytic bath to form a metal oxide layer thereon through micro-arc oxidation; and (c) forming a plurality of conductive contacts on the metal oxide layer for electrical connection with the electronic component.

Applicants respectfully traverse the rejection of claims 1-10 under 35 U.S.C. § 103(a).

Rabiet is, as understood, is directed to a process including steps of first anodizing an aluminum substrate in a porous anodization bath containing sulfuric acid and CrO_3 solution, and then anodizing the aluminum substrate in a barrier anodization bath containing boric acid and ammonia.

In contrast, independent claim 1 is directed to a method for manufacturing a high-efficiency thermal conductive base board for electrical connection with an electronic components comprising, *inter alia*, oxidizing the metal substrate through micro-arc oxidation, as discussed in greater detail above.

Rabiet and/or Celnik do not teach or suggest all of the features recited by Applicant in independent claim 1. First, Rabiet does not teach or suggest forming the oxide layer through micro-arc oxidation as recited by Applicant in independent claim 1. Micro-arc oxidation is a process for forming a protective oxide layer on a highly reactive surface so as to protect such surface from corrosion in an aqueous environment. During the process of micro-arc oxidation, a metal substrate is submerged in an electrolytic bath, and a controlled high-voltage AC power is applied to the surface of the substrate (see e.g., Example 1, pages 9-10 of the present specification). Through the applied high voltage and high current, plasma discharges are developed at the interface between the surface of the metal substrate and the electrolytic bath. The so-called plasma discharges appear as a number of discrete short-lived micro discharges moving across the surface of the metal substrate for oxidizing in turn the surface of the metal substrate. The use of the micro-arc oxidation technique in forming a metal oxide layer on a metal substrate, on which is subsequently formed a plurality of conductive contacts, is neither taught nor suggested in either Rabiet, Celnik or by the combination of Rabiet and Celnik.

As for the first and second anodization treatments set forth in Rabiet, these process steps are related to conventional anodization treatment and are not micro-arc oxidation process steps. It is known in the art that during the process of conventional anodization treatment, a metal substrate to be anodized (i.e., an anode) is connected to the positive terminal of a DC power source, and a non-reactive metal specimen (i.e., a cathode) is connected to the negative terminal.

Both of the metal substrate and the non-reactive metal specimen are immersed in an electrolytic bath, and a DC voltage is applied across them.

These conventional process steps are in contrast to the micro-arc oxidation process step of the present invention utilizing a high-voltage AC power is applied to the surface of the metal substrate. The arc power of the micro-arc oxidation is much higher than the power of the traditional anodization, oxidation rate of the aluminum ions released from the electrolytic bath in the micro-arc oxidation is greatly enhanced, thereby resulting in a highly compact and good heat-conductive metal oxide layer as compared to the traditional anodization treatments, such as the treatment disclosed in Rabiet (see e.g., paragraph bridging pages 10-11 of the present specification). Furthermore, there is nothing in Celnik that teaches or suggests any of the limitations in independent claim 1 not taught or suggested by Rabiet.

Applicant submits that dependent claims 2-10 are distinguishable from Rabiet and/or Celnik for at least the following reasons. To begin, dependent claims 2-10 are believed to be distinguishable from Rabiet and/or Celnik as depending from what are believed to be allowable independent claim 1, as discussed above.

In addition, Applicant submits the claim 2 is distinguishable from Rabiet and/or Celnik because Rabiet and/or Celnik fail to teach or suggest a forming step wherein the conductive contacts are formed through cathodic arc plasma ion plating. Rabiet discloses formation of metal film on the oxide layers that are formed by the traditional first and second anodization treatments by either subtractive or panel plating, or semi-additive method, and the Celnik reference discloses formation of a conducting network on a metal layer (e.g., copper layer) through use of a photosensitive resin or a hard soldering paste. Neither Rabiet nor Celnik teach formation of conductive contacts on the metal oxide layer using cathodic arc plasma ion plating techniques as defined in claim 2 of this invention. Therefore, claim 2 is distinguishable from Rabiet and/or Celnik.

Further, the Examiner recites that claims 7 and 8 are obvious because the concentration of water-soluble salts as well as the use of copper acetate are within the ordinary skill of an artisan and therefore would have been obvious. However, the Examiner provides no support for this conclusion in either Rabiet or Celnik. Thus, Applicant respectfully submits that the

Examiner has reached his conclusion based on the teachings in Applicant's specification, which is impermissible hindsight reasoning by the Examiner.

If, *arguendo*, the concentrations and the use of copper acetate were considered within the skill of a skilled artisan, the mere fact that it is within the skill of a skilled artisan, alone, does not render the present invention obvious. The applicant has not provided any evidence that the concentrations and the use of copper acetate, as recited in dependent claims 7 and 8, are obvious to one of ordinary skill in the art reviewing Rabiet and/or Celnik. The present invention utilizes a micro-arc oxidation process step, which is in contrast to the conventional anodization process steps recited in Rabiet. The conditions under which the process steps take place are different in traditional anodization and micro-arc oxidation, as discussed more fully above. For example, traditional anodization uses a direct current (DC), while the micro-arc oxidation of the present invention utilizes an alternating current (AC). Therefore, an artisan skilled in the art reviewing Rabiet and Celnik would not find the concentrations and the use of copper acetate in the micro-arc oxidation process step of the present invention obvious.

In view of the above, dependent claims 2-10 are believed to be distinguishable from Rabiet and/or Celnik and therefore are not anticipated nor rendered obvious by Rabiet and/or Celnik. In addition, claims 2-10 recite further limitations that distinguish over the applied art. In conclusion, it is respectfully submitted that claims 2-10 are not anticipated nor rendered obvious by Rabiet and/or Celnik and are therefore allowable.

CONCLUSION

In view of the above, Applicant respectfully requests reconsideration of the Application and withdrawal of the outstanding rejections. As a result of the amendments and remarks presented herein, Applicant respectfully submits that claims 1-10 are not anticipated by nor rendered obvious by Rabiet, Celnik or their combination and thus, are in condition for allowance. As the claims are not anticipated by nor rendered obvious in view of the applied art, Applicant requests allowance of claims 1-10 in a timely manner. If the Examiner believes that prosecution of this Application could be expedited by a telephone conference, the Examiner is encouraged to contact the Applicant.

Application No. 10/816,257
Attorney Docket No. 20984-0012-01

The Commissioner is hereby authorized to charge any additional fees and credit any overpayments to Deposit Account No. 50-1059.

Respectfully submitted,
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Dated: November 10, 2005

PTO/SB/97 (08-03)
Approved for use through 07/31/2006. OMB 0651-0031
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Attorney Docket No.: 20984-0012-01
Application No.: 10/816,257 Filed: April 1, 2004